Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A magnetic resonance imaging method comprising the steps of:

a.) generating magnetic resonance signals, having signal amplitudes and phases, by:

i.) producing a uniform magnetic field, utilizing a main coil system comprising a plurality of main coils to produce said uniform magnetic field;

ii.) generating RF excitation pulses, utilizing a transmission coil to generate said RF excitation pulses, such that said RF excitation pulses excite nuclear spins in an object that is to be imaged, which is residing within said uniform magnetic field;

iii.) terminating said RF excitation pulses to relax said nuclear spins and thereby emit magnetic resonance signals;

b.) generating temporary magnetic gradient fields, utilizing a plurality of gradient coils, by applying a temporary gradient pulse to said gradient coils to generate said temporary magnetic gradient fields;

c.) superposing said temporary magnetic gradient fields on said uniform magnetic field to provide spatial encoding of the magnetic resonance signals being emitted;

d.) receiving said spatially encoded magnetic resonance signals, utilizing a receiving coil;

e.) correcting said signal amplitudes of said spatially encoded magnetic resonance signals, or quantities calculated from said spatially encoded signal amplitudes for deviations based on spatial non-linearities in the magnetic field strength of said temporary magnetic gradient fields, utilizing correction means, to produce corrected magnetic resonance signals, said step of correcting including calculating deviations of actual magnetic gradient field from an ideal gradient field using the geometrical shape of the gradient coils and the time profile of the temporary current pulse through the gradient coils; and

f.) outputting said corrected magnetic resonance signals, utilizing output means, to form a magnetic resonance image.

2. (currently amended) The magnetic resonance imaging method according to claim [[1]] 4, wherein said step of generating temporary magnetic gradient fields includes applying a temporary current pulse to said gradient coils, and said step of correcting the signal amplitudes of the magnetic resonance signals includes calculating deviations of actual magnetic gradient field from an ideal gradient field using the geometrical shape of the gradient coils and the time profile of the temporary current pulse through the gradient coils.

3. (previously presented) The magnetic resonance imaging method according to claim 1, wherein said magnetic resonance signals are diffusion-weighted.

4. (currently amended) A ~~The~~ magnetic resonance imaging method ~~according to claim 3,~~ comprising the steps of:

a.) generating magnetic resonance signals, having signal amplitudes and phases, by:

i.) producing a uniform magnetic field, utilizing a main coil system comprising a plurality of main coils to produce said uniform magnetic field;

ii.) generating RF excitation pulses, utilizing a transmission coil to generate said RF excitation pulses, such that said RF excitation pulses excite nuclear spins in an object that is to be imaged, which is residing within said uniform magnetic field;

iii.) terminating said RF excitation pulses to relax said nuclear spins and thereby emit magnetic resonance signals;

b.) generating temporary magnetic gradient fields, utilizing a plurality of gradient coils to generate said temporary magnetic gradient fields, wherein said uniform magnetic field, said temporary magnetic gradient fields and said RF excitation pulses comprise part of a pulse sequence including a preparation section and an imaging section, and said temporary magnetic gradient fields include a bipolar gradient pair in the preparation section;

c.) superposing said temporary magnetic gradient fields on said uniform magnetic field to provide spatial encoding of the magnetic resonance signals being emitted;

d.) receiving said spatially encoded magnetic resonance signals, utilizing a receiving coil;

e.) correcting said signal amplitudes of said spatially encoded magnetic resonance signals, or quantities calculated from said spatially encoded signal amplitudes for deviations based on spatial non-linearities in the magnetic field strength of said temporary magnetic gradient fields, utilizing correction means, to produce corrected magnetic resonance signals; and

f.) outputting said corrected magnetic resonance signals, utilizing output means, to form a magnetic resonance image.

5. (currently amended) A ~~The~~ magnetic resonance imaging method ~~according to claim 3,~~ comprising the steps of:

a.) generating magnetic resonance signals, having signal amplitudes and phases, by:

i.) producing a uniform magnetic field, utilizing a main coil system comprising a plurality of main coils to produce said uniform magnetic field;

ii.) generating RF excitation pulses, utilizing a transmission coil to generate said RF excitation pulses, such that said RF excitation pulses excite nuclear spins in an object that is to be imaged, which is residing within said uniform magnetic field;

iii.) terminating said RF excitation pulses to relax said nuclear spins and thereby emit magnetic resonance signals;

b.) generating temporary magnetic gradient fields, utilizing a plurality of gradient coils to generate said temporary magnetic gradient fields, wherein said uniform magnetic field, said temporary magnetic gradient fields and said RF excitation pulses comprise part of a pulse sequence including a preparation section and an imaging section, and said temporary gradient fields include a pair of gradient pulses that have the same polarity and are separated by a refocusing pulse in the preparation section;

c.) superposing said temporary magnetic gradient fields on said uniform magnetic field to provide spatial encoding of the magnetic resonance signals being emitted;

d.) receiving said spatially encoded magnetic resonance signals, utilizing a receiving coil;

e.) correcting said signal amplitudes of said spatially encoded magnetic resonance signals, or quantities calculated from said spatially encoded signal amplitudes for deviations based on spatial non-linearities in the magnetic field strength of said temporary magnetic gradient fields, utilizing correction means, to produce corrected magnetic resonance signals; and

f.) outputting said corrected magnetic resonance signals, utilizing output means, to form a magnetic resonance image.

6. (previously presented) The magnetic resonance imaging method according to claim 3, wherein the magnetic resonance imaging method is diffusion-related and a diffusion sensitivity parameter (b) is a quantity calculated from said amplitudes of said magnetic resonance signals, which is corrected for deviations based on spatial non-linearities of the temporary magnetic gradient fields.

7. (previously presented) The magnetic resonance imaging method according to claim 1, wherein the magnetic resonance imaging method is flow-related and a flow sensitivity parameter (Q) is a quantity calculated from said amplitudes of said magnetic resonance signals, which is corrected for deviations based on spatial non-linearities of the temporary magnetic gradient fields.

8. (currently amended) A magnetic resonance imaging system comprising:

a.) means for generating magnetic resonance signals, having signal amplitudes and phases, said means including:

i.) means for producing a uniform magnetic field, and

ii.) means for alternatively generating and terminating RF excitation pulses to excite nuclear spins in an object being imaged, residing within said uniform magnetic field, thereby causing the emission of magnetic resonance signals;

b.) means for generating temporary magnetic gradient fields and superposing them on said uniform magnetic field to spatially encode said magnetic resonance signals being emitted, thereby producing spatially encoded magnetic resonance signals, said means for generating temporary magnetic gradient fields comprising means for applying a temporary gradient pulse to said gradient coils to generate said temporary magnetic gradient fields;

c.) means for receiving said spatially encoded magnetic resonance signals;

d.) means for correcting said signal amplitudes of said magnetic resonance signals, or quantities calculated from said signal amplitudes, for deviations based on spatial non-linearities in the magnetic field strength of said temporary magnetic gradient fields, to produce corrected magnetic resonance signals, said means for correcting comprising means for calculating deviations of actual magnetic gradient field from an ideal gradient field using the geometrical shape of the gradient coils and the time profile of the temporary current pulse through the gradient coils; and

e.) means for outputting said corrected magnetic resonance signals and forming a magnetic resonance image therefrom.

9. (currently amended) A computer-readable medium storing a computer program with computer executable instructions for performing the steps of:

a.) generating magnetic resonance signals in a magnetic resonance imaging system, said magnetic resonance signals having signal amplitudes and phases, by:

i.) producing a uniform magnetic field, utilizing a main coil system comprising a plurality of main coils to produce said uniform magnetic field;

ii.) generating RF excitation pulses, utilizing a transmission coil to generate said RF excitation pulses, such that said RF excitation pulses excite nuclear spins in an object that is to be imaged, which is residing within said uniform magnetic field;

iii.) terminating said RF excitation pulses to relax said nuclear spins and thereby emit magnetic resonance signals;

b.) generating temporary magnetic gradient fields in said magnetic resonance system, utilizing a plurality of gradient coils, by applying a temporary gradient pulse to said gradient coils to generate said temporary magnetic gradient fields;

c.) superposing said temporary magnetic gradient fields on said uniform magnetic field to provide spatial encoding of the magnetic resonance signals being emitted;

d.) receiving said spatially encoded magnetic resonance signals, utilizing a receiving coil;

e.) correcting said signal amplitudes of said spatially encoded magnetic resonance signals, or quantities calculated from said spatially encoded signal amplitudes for deviations

based on spatial non-linearities in the magnetic field strength of said temporary magnetic gradient fields, utilizing correction means, to produce corrected magnetic resonance signals, said step of correcting including calculating deviations of actual magnetic gradient field from an ideal gradient field using the geometrical shape of the gradient coils and the time profile of the temporary current pulse through the gradient coils; and

f.) outputting said corrected magnetic resonance signals, utilizing output means, to form a magnetic resonance image.

10. (new) The magnetic resonance imaging method according to claim 5, wherein said step of generating temporary magnetic gradient fields includes applying a temporary current pulse to said gradient coils, and said step of correcting the signal amplitudes of the magnetic resonance signals includes calculating deviations of actual magnetic gradient field from an ideal gradient field using the geometrical shape of the gradient coils and the time profile of the temporary current pulse through the gradient coils.

11. (new) A magnetic resonance imaging system comprising:

a.) means for generating diffusion-weighted magnetic resonance signals, having signal amplitudes and phases, said means including:

i.) means for producing a uniform magnetic field, and

ii.) means for alternatively generating and terminating RF excitation pulses to excite nuclear spins in an object being imaged, residing within said uniform magnetic field, thereby causing the emission of magnetic resonance signals;

b.) means for generating temporary magnetic gradient fields and superposing them on said uniform magnetic field to spatially encode said magnetic resonance signals being emitted, thereby producing spatially encoded magnetic resonance signals, wherein said uniform magnetic field, said temporary magnetic gradient fields and said RF excitation pulses comprise part of a pulse sequence including a preparation section and an imaging section, and said temporary magnetic gradient fields include a bipolar gradient pair in the preparation section;

c.) means for receiving said spatially encoded magnetic resonance signals;

d.) means for correcting said signal amplitudes of said magnetic resonance signals, or quantities calculated from said signal amplitudes, for deviations based on spatial non-

linearities in the magnetic field strength of said temporary magnetic gradient fields, to produce corrected magnetic resonance signals; and

e.) means for outputting said corrected magnetic resonance signals and forming a magnetic resonance image therefrom.

12. (new) A magnetic resonance imaging system according to claim 11, wherein said means for generating temporary magnetic gradient fields includes means for applying a temporary current pulse to said gradient coils, and said means for correcting the signal amplitudes of the magnetic resonance signals includes means for calculating deviations of actual magnetic gradient field from an ideal gradient field using the geometrical shape of said gradient coils and the time profile of the temporary current pulse through said gradient coils.

13. (new) A magnetic resonance imaging system comprising:

a.) means for generating diffusion-weighted magnetic resonance signals, having signal amplitudes and phases, said means including:

i.) means for producing a uniform magnetic field, and

ii.) means for alternatively generating and terminating RF excitation pulses to excite nuclear spins in an object being imaged, residing within said uniform magnetic field, thereby causing the emission of magnetic resonance signals;

b.) means for generating temporary magnetic gradient fields and superposing them on said uniform magnetic field to spatially encode said magnetic resonance signals being emitted, thereby producing spatially encoded magnetic resonance signals, wherein said uniform magnetic field, said temporary magnetic gradient fields and said RF excitation pulses comprise part of a pulse sequence including a preparation section and an imaging section, and said temporary gradient fields include a pair of gradient pulses that have the same polarity and are separated by a refocusing pulse in the preparation section;

c.) means for receiving said spatially encoded magnetic resonance signals;

d.) means for correcting said signal amplitudes of said magnetic resonance signals, or quantities calculated from said signal amplitudes, for deviations based on spatial non-linearities in the magnetic field strength of said temporary magnetic gradient fields, to produce corrected magnetic resonance signals; and

e.) means for outputting said corrected magnetic resonance signals and forming a magnetic resonance image therefrom.

14. (new) The magnetic resonance imaging system according to claim 13, wherein said means for generating temporary magnetic gradient fields includes means for applying a temporary current pulse to said gradient coils, and said means for correcting the signal amplitudes of the magnetic resonance signals includes means for calculating deviations of actual magnetic gradient field from an ideal gradient field using the geometrical shape of said gradient coils and the time profile of the temporary current pulse through said gradient coils.

15. (new) A computer-readable medium storing a computer program with computer executable instructions for performing the steps of:

a.) generating diffusion-weighted magnetic resonance signals in a magnetic resonance imaging system, said magnetic resonance signals having signal amplitudes and phases, by:

i.) producing a uniform magnetic field, utilizing a main coil system comprising a plurality of main coils to produce said uniform magnetic field;

ii.) generating RF excitation pulses, utilizing a transmission coil to generate said RF excitation pulses, such that said RF excitation pulses excite nuclear spins in an object that is to be imaged, which is residing within said uniform magnetic field;

iii.) terminating said RF excitation pulses to relax said nuclear spins and thereby emit magnetic resonance signals;

b.) generating temporary magnetic gradient fields in said magnetic resonance system, utilizing a plurality of gradient coils to generate said temporary magnetic gradient fields, wherein said uniform magnetic field, said temporary magnetic gradient fields and said RF excitation pulses comprise part of a pulse sequence including a preparation section and an imaging section, and said temporary magnetic gradient fields include a bipolar gradient pair in the preparation section;

c.) superposing said temporary magnetic gradient fields on said uniform magnetic field to provide spatial encoding of the magnetic resonance signals being emitted;

d.) receiving said spatially encoded magnetic resonance signals, utilizing a receiving coil;

e.) correcting said signal amplitudes of said spatially encoded magnetic resonance signals, or quantities calculated from said spatially encoded signal amplitudes for deviations based on spatial non-linearities in the magnetic field strength of said temporary magnetic gradient fields, utilizing correction means, to produce corrected magnetic resonance signals; and

f.) outputting said corrected magnetic resonance signals, utilizing output means, to form a magnetic resonance image.

16. (new) The computer-readable medium according to claim 15, wherein said step of generating temporary magnetic gradient fields includes applying a temporary current pulse to said gradient coils, and said step of correcting the signal amplitudes of the magnetic resonance signals includes calculating deviations of actual magnetic gradient field from an ideal gradient field using the geometrical shape of the gradient coils and the time profile of the temporary current pulse through the gradient coils.

17. (new) A computer-readable medium storing a computer program with computer executable instructions for performing the steps of:

a.) generating diffusion-weighted magnetic resonance signals in a magnetic resonance imaging system, said magnetic resonance signals having signal amplitudes and phases, by:

i.) producing a uniform magnetic field, utilizing a main coil system comprising a plurality of main coils to produce said uniform magnetic field;

ii.) generating RF excitation pulses, utilizing a transmission coil to generate said RF excitation pulses, such that said RF excitation pulses excite nuclear spins in an object that is to be imaged, which is residing within said uniform magnetic field;

iii.) terminating said RF excitation pulses to relax said nuclear spins and thereby emit magnetic resonance signals;

b.) generating temporary magnetic gradient fields in said magnetic resonance system, utilizing a plurality of gradient coils to generate said temporary magnetic gradient fields, wherein said uniform magnetic field, said temporary magnetic gradient fields and said RF

excitation pulses comprise part of a pulse sequence including a preparation section and an imaging section, and said temporary gradient fields include a pair of gradient pulses that have the same polarity and are separated by a refocusing pulse in the preparation section;

c.) superposing said temporary magnetic gradient fields on said uniform magnetic field to provide spatial encoding of the magnetic resonance signals being emitted;

d.) receiving said spatially encoded magnetic resonance signals, utilizing a receiving coil;

e.) correcting said signal amplitudes of said spatially encoded magnetic resonance signals, or quantities calculated from said spatially encoded signal amplitudes for deviations based on spatial non-linearities in the magnetic field strength of said temporary magnetic gradient fields, utilizing correction means, to produce corrected magnetic resonance signals; and

f.) outputting said corrected magnetic resonance signals, utilizing output means, to form a magnetic resonance image.

18. (new) The computer-readable medium according to claim 17, wherein said step of generating temporary magnetic gradient fields includes applying a temporary current pulse to said gradient coils, and said step of correcting the signal amplitudes of the magnetic resonance signals includes calculating deviations of actual magnetic gradient field from an ideal gradient field using the geometrical shape of the gradient coils and the time profile of the temporary current pulse through the gradient coils.